UNIVERSITY OF MINNESOTA | EXTENSION

EXTENSION CENTER FOR COMMUNITY VITALITY

Economic Contribution of Southern Minnesota Beet Sugar Cooperative

A REPORT OF THE ECONOMIC IMPACT ANALYSIS PROGRAM

Authored by Brigid Tuck

PROGRAM SPONSOR: SOUTHERN MINNESOTA BEET SUGAR COOPERATIVE

Economic Contribution of Southern Minnesota Beet Sugar Cooperative

A REPORT OF THE ECONOMIC IMPACT ANALYSIS PROGRAM

March 2019

Authored by Brigid Tuck, Senior Economic Impact Analyst

Editor:
Elyse Paxton, Senior Editor, Extension Center for Community Vitality

Report Reviewers:
Steve Domm, President and CEO, Southern Minnesota Beet Sugar Cooperative
Todd Geselius, Vice President of Agriculture, Southern Minnesota Beet Sugar Cooperative
William Lazarus, Professor and Extension Economist, Department of Applied Economics, University of Minnesota
Marcy Miller, Corporate Controller, Southern Minnesota Beet Sugar Cooperative

Partner:
Southern Minnesota Beet Sugar Cooperative

Table of Contents

Authored by Brigid Tuck, Senior Economic Impact Analyst

EXECUTIVE SUMMARY: ECONOMIC CONTRIBUTION OF SOUTHERN MINNESOTA BEET SUGAR COOPERATIVE

Minnesota is the nation's leading sugarbeet producer. As a result, sugarbeets play an important role in the state's economy. Southern Minnesota Beet Sugar Cooperative (SMBSC), located in Renville, is a major beet sugar extraction cooperative. Five hundred twelve shareholders annually grow approximately 3.6 million tons of sugarbeets, producing up to one billion pounds of pure white sugar.

Given its production and extraction role, Southern Minnesota Beet Sugar Cooperative wanted to understand its contribution to the regional and state economy. SMBSC hired University of Minnesota Extension to conduct an economic contribution analysis. The primary study area for the analysis was the 20-county region in which SMBSC shareholders grow sugarbeets. The counties included were Big Stone, Brown, Chippewa, Cottonwood, Douglas, Kandiyohi, Lac qui Parle, Lyon, McLeod, Meeker, Nicollet, Pope, Redwood, Renville, Sibley, Stearns, Stevens, Swift, Watonwan, and Yellow Medicine.

Beet Production and Sugar Extraction: In 2017, Minnesota produced 12.5 million tons of sugarbeets, making it the nation's largest sugarbeet producing state. Minnesota's 2017 production was the largest recorded harvest. It accounted for 35 percent of national production. Minnesota is served by three major beet sugar extraction cooperatives. Two are in the Red River Valley. The third is Southern Minnesota Beet Sugar Cooperative.

Direct Effect of Sugarbeet Production: Sugarbeet growers (shareholders of SMBSC) spent an estimated $159.8 million to produce their 2017 crop. This includes $28.0 million in labor income. There were an estimated 1,750 workers (including shareholders and hired labor) involved in sugarbeet production. It is important to note that, while labor income estimates include a labor and management charge for the producer, producers may receive profits from their operation above labor income.

Direct Effect of Beet Sugar Extraction: In FY 2017-2018, Southern Minnesota Beet Sugar Cooperative spent $198.5 million to operate (not including the purchase of sugarbeets). This included $61.0 million in payments for labor. The Cooperative employed 830 workers. In addition, its third-party trucking company employed 110 truckers to haul sugarbeets.

Total Economic Contribution of Southern Minnesota Beet Sugar Cooperative: In total, Southern Minnesota Beet Sugar Cooperative contributed an estimated $708.5 million in economic activity to the 20-county region in 2017. The Cooperative supported 4,965 jobs. It contributed $197.5 million of income to regional residents. It also contributed $19.9 million in taxes to local and state governments. The largest share of ripple effect jobs were in the real estate industry followed by the professional and scientific services and wholesale trade industries.

Economic Contribution through Time: Overall, factors influencing the economic contribution of Southern Minnesota Beet Sugar Cooperative are trending up, indicating the economic contribution of SMBSC is increasing in the region.

Economic Contribution in Minnesota: In 2017, SMBSC generated an estimated $817.8 million in economic activity in the state, including $227.9 million in labor income. Southern Minnesota Beet Sugar Cooperative supported 5,240 jobs in the state.

Notes on the Analysis: The data, analysis, and findings described in this report are specific to the geography, period, and project requirements of Southern Minnesota Beet Sugar Cooperative.

INTRODUCTION

Minnesota is the nation's leading sugarbeet producing state. As a result, sugarbeets play an important role in the state's economy. Southern Minnesota Beet Sugar Cooperative (SMBSC), located in Renville, is a major beet sugar extraction cooperative. Five hundred twelve shareholders grow 3.6 million tons of sugarbeets annually, producing up to one billion pounds of pure white sugar for the Cooperative.

Given its production and extraction role, Southern Minnesota Beet Sugar Cooperative wanted to understand its contribution to the regional and state economy. SMBSC hired University of Minnesota Extension to conduct an economic contribution analysis. This report presents the results.

The primary study area for the analysis was the 20-county region in which SMBSC shareholders grow sugarbeets. The counties included were Big Stone, Brown, Chippewa, Cottonwood, Douglas, Kandiyohi, Lac qui Parle, Lyon, McLeod, Meeker, Nicollet, Pope, Redwood, Renville, Sibley, Stearns, Stevens, Swift, Watonwan, and Yellow Medicine.

The Beet Sugar Extraction Process

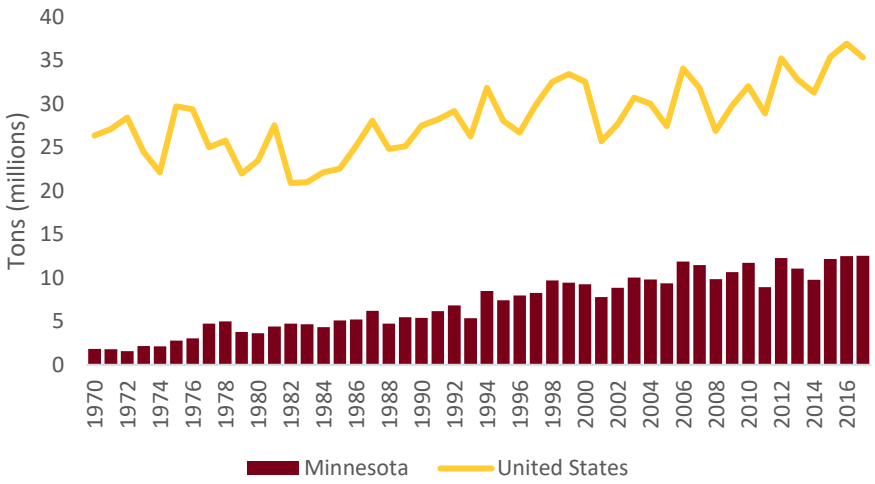
Shareholders grow sugarbeets and Southern Minnesota Beet Sugar Cooperative extracts the beet sugar. Growers harvest beets and deliver them to either the extraction plant or local collection sites. At the extraction plant, the beets are cleaned with water, and any rocks and remaining debris are removed before the beets are sliced. The sliced beets are put in the extraction system where hot water is used to extract a raw beet juice, which contains the sugar removed from the beet. The raw beet juice is treated in a complex purification system to create a clear juice that is stable to heat. Water is then removed from the clear juice through an energy-efficient, multiple-effect evaporation system creating two streams—thick sugar syrup and distilled water.

Sugar is crystallized out of the thick syrup by growing sugar crystals during a boiling process. The syrup undergoes three successive boiling steps where three grades of sugar are crystallized out. The first boiling creates white, fine granulated sugar, which is dried and made available for sale. The second and third boiling create high-color sugar that is dissolved into the thick syrup going to the first boiling to increase its sugar content. About 88 percent of the sugar can be removed through crystallization, leaving beet molasses as the byproduct. Through a process called ion-exclusion, about 65 percent of the sugar left in the molasses can be recovered.

Sugarbeet Production in Minnesota

In 2017, Minnesota produced 12.5 million tons of sugarbeets, making it the nation's largest sugarbeet producing state (followed by Idaho, North Dakota, Michigan, and Nebraska). Sugarbeet production varies by year, but in general, total production has been increasing since the 1970s (Chart 1). Minnesota's 2017 production was the largest recorded harvest. It accounted for 35 percent of national production.

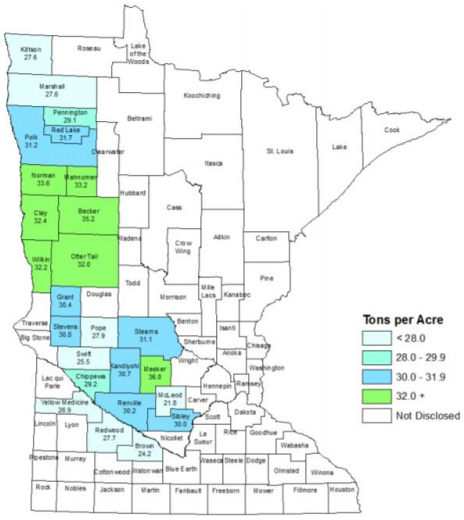
Chart 1: Sugarbeet Production, 1970 to 2017



Source: USDA

Minnesota's sugarbeet production is concentrated along the Red and Minnesota River Valleys, extending from Northwest Minnesota into Southwest/South Central Minnesota (Map 1).

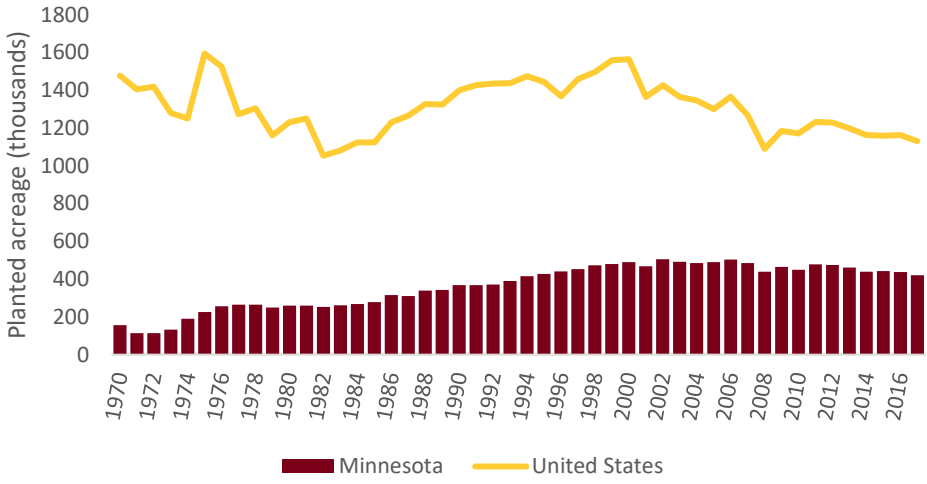
Map 1: Sugarbeet Production by Minnesota County, 2017



Source: USDA

Planted sugarbeet acreage in the United States has declined from its peak in 2000. Minnesota's planted acreage has also been trending down during the past five years (Chart 2). Despite this trend, total production (in tons) continues to increase. This is a result of improved sugarbeet hybrids, which allows higher production per acre.

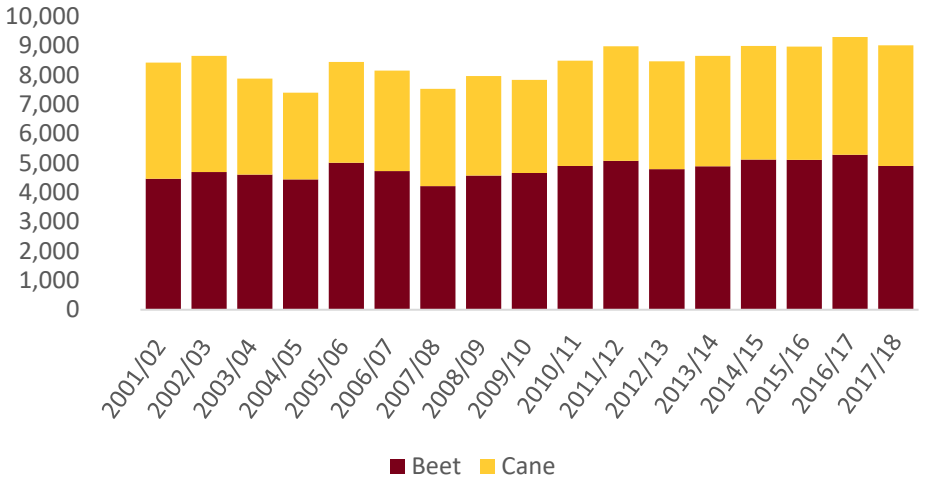
Chart 2: Planted Sugarbeet Acrage, 1970-2018



Source: USDA

Overall, United States sugar production continues to increase. In fiscal year 2017-2018, the United States' sugar production was an estimated 9 million short tons (raw value). This is a 14 percent increase compared to fiscal year 2001-2002 (Chart 3). Sugar extracted from beets accounts for slightly more than 50 percent of sugar production nationally.

Chart 3: United States Sugar Production by Fiscal Year, 2001-2019



Source: USDA

Beet Sugar Extraction in Minnesota

Minnesota is served by three major beet sugar extraction cooperatives. Two are in the Red River Valley. The third is Southern Minnesota Beet Sugar Cooperative. The Cooperative has 512 shareholders that grow approximately 3.6 million tons of sugarbeets annually, roughly one-quarter of Minnesota's total production. The sugarbeets, in turn, produce up to one billion pounds of pure white sugar.

ECONOMIC CONTRIBUTION

Total economic contribution is composed of direct, indirect, and induced effects. Calculating the total economic contribution of a business begins with determining its direct effects. Indirect and induced effects are then calculated using input-output models.

Southern Minnesota Beet Sugar Cooperative contributes to the economy in two ways. First, the Cooperative spends money for its extraction operations, purchasing items such as extraction and packaging equipment and materials, laboratory equipment, repair and maintenance services, and utilities. One of the major inputs into the extraction facility is, of course, sugarbeets. Second, sugarbeet producers also contribute to the economy through growing and harvesting activities. This analysis measures the impact of both the extraction and production of sugarbeets associated with Southern Minnesota Beet Sugar Cooperative. These are the direct effects of the Cooperative.

Input-output models trace the flow of dollars throughout a local economy and capture the indirect and induced, or secondary, effects of an economic activity. To quantify the indirect and induced effects of Southern Minnesota Beet Sugar Cooperative, the direct effects were entered into the input-output model IMPLAN. This analysis uses IMPLAN version 3.0 with SAM multipliers and 2016 data.[1]

Indirect effects are those associated with a change in economic activity due to spending for goods and services directly tied to the business. In this case, these are the changes in the local economy occurring because Southern Minnesota Beet Sugar Cooperative purchases goods (e.g., extraction materials and equipment, utilities, and laboratory equipment) and related services (e.g., advertising services, accounting, and tax preparation). As the Cooperative makes purchases, this creates an increase in purchases across the supply chain. Indirect effects are the summary of these changes across an economy.

Types of Effects

Direct: Spending and employment by Southern Minnesota Beet Sugar Cooperative and its member growers

Indirect: Activity generated by Southern Minnesota Beet Sugar Cooperative and member spending for goods and services (business-to-business spending)

Induced: Activity generated by Southern Minnesota Beet Sugar Cooperative's employees and member spending for household operations (consumer-to-business spending)

Induced effects are those associated with a change in economic activity due to spending by the employees of businesses (labor) and by households. These are economic changes related to spending by people directly employed by Southern Minnesota Beet Sugar Cooperative and its members. They create effects as they make purchases for things like health care, housing, and food. Induced effects also include household spending related to indirect effects.

Economic contribution effects can be measured in terms of output (sales), labor income, and employment. Output is typically the most common result of an economic contribution study. Labor income is also recommended as a measure, because it indicates the economic benefits that accrue for study area residents. Employment includes full-time, part-time, and seasonal employment, not full-time equivalents.

[1] www.implan.com

The following section details the contribution of SMBSC in the region. A later section examines its impact on the state of Minnesota. The study area in this instance matters, since the larger the study area the more options there are to purchase locally. As a result, the contribution tends to be higher in larger study areas.

Direct Effect

In fiscal year (FY) 2017-2018, Southern Minnesota Beet Sugar Cooperative and its growers spent $358.3 million to operate (Table 1).[2]

SMBSC's operational costs include those made to operate the extraction plant (inputs and payroll), to market its products, and to conduct the Cooperative's business (management). In FY 2017-2018, SMBSC spent $198.5 million on operational expenditures. This does not include the cost of raising sugarbeets.

Sugarbeet growers also make expenditures to bring the sugarbeets to the extraction plant. During the 2017 growing season, SMBSC growers spent an estimated $159.8 million to grow their beets.

Table 1: Expenditures Related to Southern Minnesota Beet Sugar Cooperative, FY 2017-2018

Sugarbeet production costs	$159.8 million
Cooperative extraction expenditures (excluding beet payment)	$198.5 million
Total expenditures	$358.3 million

Source: University of Minnesota Estimates (based on FINBIN) and SMBSC

The two expenditure categories included above in Table 1 comprise Southern Minnesota Beet Sugar Cooperative's direct effect. Broadly, the categories can be grouped as production and extraction. The sugarbeet growers' expenditures contribute to the production direct effect. The operational expenditures create the extraction direct effect. Each expenditure category generates different indirect and induced effects. Thus, adequately quantifying the total economic contribution requires separating the two components. The next two sections of this report explain how the direct effects were measured and entered into the input-output model.

Sugarbeet Production

The direct effect of sugarbeet production is essentially the spending and labor by growers to produce sugarbeets for the Cooperative. In total, SMBSC shareholders spent an estimated $159.8

[2] Southern Minnesota Beet Sugar Cooperative's fiscal year runs from September 1 to August 31.

million to plant and harvest their 2017 sugarbeet crop (Table 1). Direct costs, including seed, fertilizer, and land rent were the largest costs. [3]

Included in the total is an estimated $28.0 million for labor (custom, hired, and management). While labor income estimates include a labor and management charge for the producer, producers may receive profits from their operation above labor charges.

To determine estimated expenditures per acre, Extension used the sugarbeet crop budget from University of Minnesota's farm financial database FINBIN (see full budget in Appendix 1). Specifically, Extension used the budget for growers in Southern Minnesota, as growing conditions, prices, and inputs vary between Southern Minnesota and the Red River Valley.

The Cooperative had 512 shareholders. In 2017, SMBSC shareholders planted 126,965.8 acres.

Table 2: Estimated Expenditures by Shareholders (Sugarbeet Producers) for Southern Minnesota Beet Sugar Cooperative, 2017 Growing Season

Expenditure Category	Per Acre	Total (Millions)
Direct expenses		
Seed	$189.11	$24.0
Fertilizer and chemicals	$228.45	$29.0
Land rent	$235.51	$29.9
Hauling and trucking[4]	$27.57	$3.5
All other direct expenses	$234.04	$29.7
Total direct expenses (no labor)	$914.68	$116.1
Total overhead expenses	$123.66	$15.7
Labor expenses (includes hired labor, custom hire, and a labor and management charge)	$220.63	$28.0
Total expenses	$1,258.97	$159.8

Per acre costs derived from FINBIN

[3] Extension used the FINBIN cash rent report; therefore, land rent is the value for farms paying cash rent. Obviously, not all farms rent land. This approach was taken to allow cash rent to serve as a proxy for the land costs for those owning their land.

[4] Hauling and trucking costs can be split across categories. For example, if a producer custom hires for trucking, then the costs related to the truck itself might be classified as hauling and trucking, but the labor might be classified under custom hire (labeled as labor expenses in Table 2).

The direct effect of SMBSC sugarbeet producers was $159.8 million of output, including $28.0 million of labor income. Extension estimates there were 1,750 workers directly employed by sugarbeet producers. This includes the 512 shareholders, plus their hired labor for planting, harvesting, and trucking.

There is no direct source for the number of workers employed by sugarbeet producers. Estimating employment is complex given the time intensive nature of planting, harvesting, and hauling sugarbeets. Sugarbeet industry experts estimate producers and hired labor work 84 hours per week during the three weeks of planting and four weeks of harvesting. Extension's conversations with industry experts also indicate the average operation has five employees during harvest season (peak employment). Operations tend to have, at a minimum, a lifter, a topper, and three trucks running during harvest. SMBSC has 512 shareholders with 350 operations. Therefore, Extension estimated there were 1,750 workers related to sugarbeet production in 2017.[5]

Table 3: Direct Effect of Shareholders (Sugarbeet Producers), Southern Minnesota Beet Sugar Cooperative, 2017

Metric	Total
Output (millions)	$159.8
Employment	1,750
Labor Income (millions)	$28.0

Estimates by University of Minnesota Extension

Sugarbeet Extraction and Cooperative Functions

In fiscal year (FY) 2017-2018[6], Southern Minnesota Beet Sugar Cooperative spent $198.5 million to extract sugar from the beets, to market its products, and to operate the Cooperative. Major expenditures included production expenses, marketing, general and administrative, and labor. SMBSC provided its budget and employment figures to Extension (Table 4).

[5] Employment could also be estimated based on hours worked. The FINBIN report lists 5.34 hours of labor per acre. Based on 84 hours per week during the three weeks of planting and four weeks of harvesting, sugarbeet production employment would be an estimated 1,150 people.

[6] Southern Minnesota Beet Sugar Cooperative's fiscal year runs from September 1 to August 31.

Table 4: Expenditures by Southern Minnesota Beet Sugar Cooperative for Sugarbeet Extraction and Cooperative Functions, FY 2017-2018

Expenditure Category	Total (Millions)
Production expenses	$68.6
Marketing expenses	$54.4
General and administrative	$14.5
Labor-related	$61.0
Total expenses	$198.5

Source: SMBSC

The Cooperative employed 830 workers during fiscal year 2017-2018. During normal production periods, the Cooperative employed 380 workers. During peak season, the Cooperative hired an additional 450 workers. It also hired a third-party trucking company to haul sugarbeets from the collection points to the extraction plant.[7] That particular trucking company reported hiring 110 truckers in 2017.

Thus, the total direct effect of beet sugar extraction and cooperative functions was $198.5 million in output, including $61.0 million in labor income and 940 jobs (Table 5).

Table 5: Direct Effect of Sugarbeet Extraction and Cooperative Functions, Southern Minnesota Beet Sugar Cooperative, FY 2017-2018

Metric	Total
Output (millions)	$198.5
Employment	940
Labor Income (millions)	$61.0

Estimates by University of Minnesota Extension

[7] Sugarbeet producers truck sugarbeets from their fields to the collection point. SMBSC hauls from the collection point to the extraction plant.

Adding the direct effect of sugarbeet production to the direct effect of beet sugar extraction and cooperative functions yields the total direct effect of Southern Minnesota Beet Sugar Cooperative (Table 6). In FY 2017-2018, SMBSC directly created $358.3 million in output in the region, including $89.0 million of income paid to workers. SMBSC was directly responsible for 2,690 full-time, part-time, and seasonal jobs.

Table 6: Total Direct Effect of Southern Minnesota Beet Sugar Cooperative, FY 2017-2018

Metric	Total	Production	Extraction
Output (millions)	$358.3	$159.8	$198.5
Employment	2,690	1,750	940
Labor Income (millions)	$89.0	$28.0	$61.0

Estimates by University of Minnesota Extension

Indirect and Induced Effects

As detailed, indirect and induced effects are measured by input-output models. Once Extension determined the direct effects, they were entered into the IMPLAN model to measure total economic contribution.

Total Effect

In total, Southern Minnesota Beet Sugar Cooperative contributed $708.5 million in economic activity to the 20 county region in 2017 (Table 7). The Cooperative supported 4,965 jobs. It contributed $197.5 million of income to regional residents.

Table 7: Total Economic Contribution of Southern Minnesota Beet Sugar Cooperative, 20-County Region, 2017

Metric	Direct	Indirect	Induced	Total
Output (millions)	$358.3	$298.2	$52.0	$708.5
Employment	2,690	1,830	445	4,965
Labor Income (millions)	$89.0	$92.3	$16.2	$197.5

Estimates by University of Minnesota Extension

Both sugarbeet production and beet sugar extraction contribute to total economic contribution. Sugarbeet production accounted for 50 percent of the total output impact in 2017 (Table 8).

Table 8: Total Economic Contribution of Southern Minnesota Beet Sugar Cooperative, Production and Extraction, 20-County Region, 2017

Metric	Production	Extraction	Total	Production Percent of Total
Output (millions)	$356.5	$352.0	$708.5	50%
Employment	2,920	2,045	4,965	59%
Labor Income (millions)	$86.5	$111.0	$197.5	44%

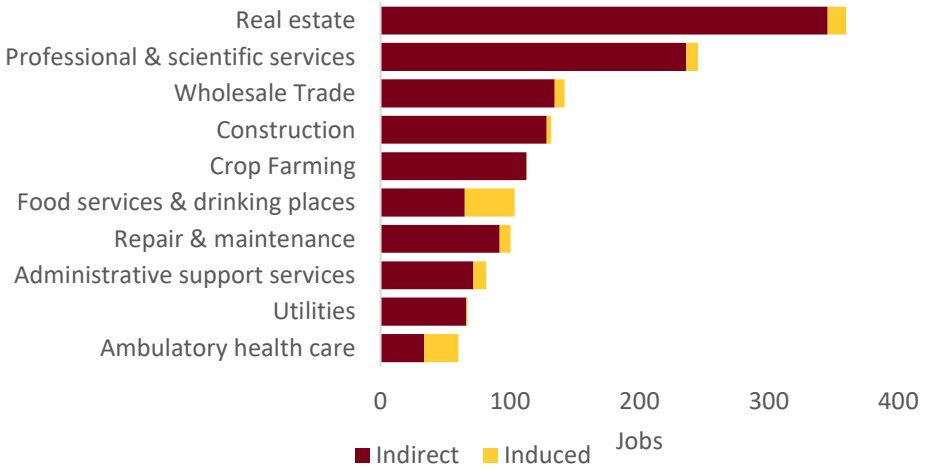
Estimates by University of Minnesota Extension

Top Industries Affected

Southern Minnesota Beet Sugar Cooperative supported 4,965 jobs in the 20-county region in 2017. Of those, 2,690 were directly involved in the production of sugarbeets and extraction of beet sugar. The other 2,275 jobs were in industries across the economy. The largest share of jobs were in the real estate industry, followed by the professional and scientific services and wholesale trade industries (Chart 4).

Southern Minnesota Beet Sugar Cooperative generated relatively high indirect effects, given that beet sugar extraction relies on a product grown in the region. Thus, the indirect effects are a significant portion of the chart. Induced effects are higher in areas related to household spending, including food and drinking places and ambulatory health care.

Chart 4: Top Industries Effected (Indirect and Induced) by Southern Minnesota Beet Sugar Cooperative, 2017, Sorted by Employment



Source: University of Minnesota estimates based on IMPLAN

Tax Contribution

In 2017, Southern Minnesota Beet Sugar Cooperative contributed $19.9 million in taxes to local and state governments (Table 9). The largest contributions were in sales, property, and income taxes.

Table 9: Total State and Local Tax Contribution of Southern Minnesota Beet Sugar Cooperative, 20-County Region, 2017

Metric	State and Local Taxes (millions)
Sales tax	$8.0
Property tax	$5.7
Income tax	$3.4
Corporate tax	$0.8
All other taxes	$2.0
Total	$19.9

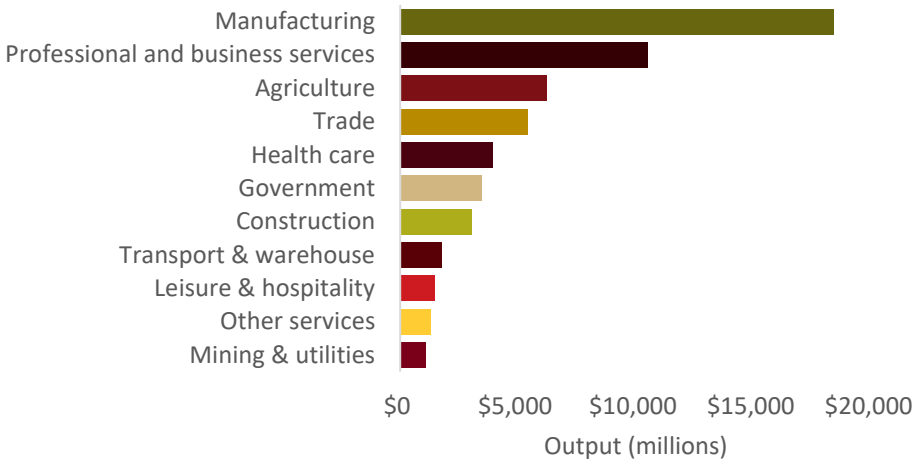
Estimates by University of Minnesota Extension

Economic Contribution in the Context of the Regional Economy

The 20-county region in this analysis includes the heart of Minnesota's agricultural industry. Renville County, home to SMBSC, was Minnesota's number one corn producing county and the number two soybean producing county in 2017. Neighboring Redwood County was the third-largest producing county for both corn and soybeans.

Not surprisingly, then, agriculture is one of the largest generators of output in the region (Chart 5). Manufacturing businesses generated $18.4 billion of output in 2016, followed by professional and business services at $10.5 billion. The third-largest industry ($6.2 billion) was agriculture. In total, businesses and enterprises in the region generated $56.5 billion in output in 2016. SMBSC directly generates jobs in both manufacturing and agriculture, thus contributing to two of the largest industry drivers in the region.

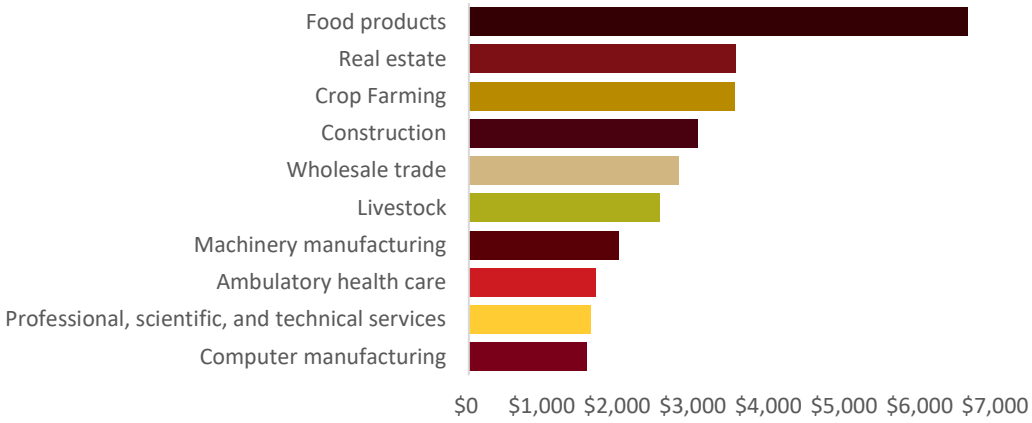
Chart 5: Output by Industry, 20-County Region, 2016



Source: IMPLAN

A major component of manufacturing in the region is food product manufacturing. Food product manufacturing includes sugarbeets, along with other major regional items like cheese and poultry. Food products is the largest sector in the region, followed by real estate, crop farming, and construction (Chart 6).

Chart 6: Top Sectors in 20-County Region, Sorted by Output



Source: IMPLAN

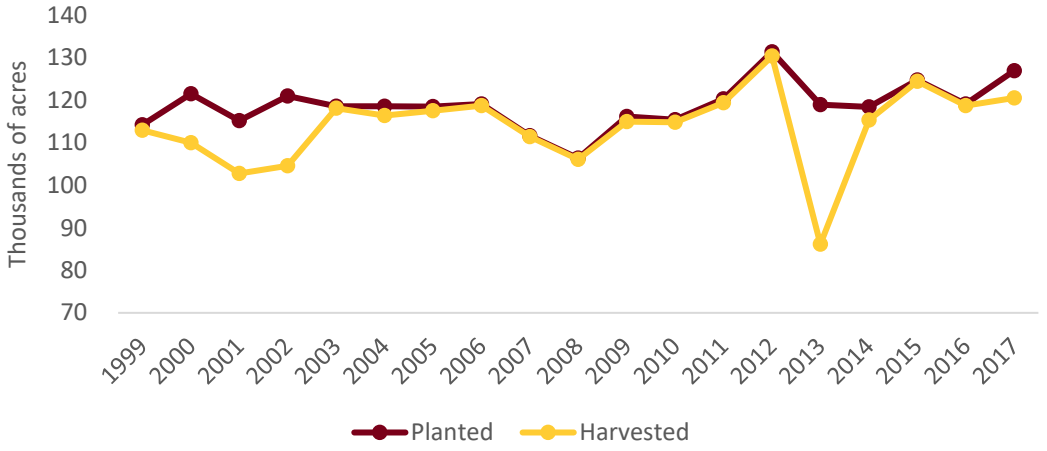
ECONOMIC CONTRIBUTION THROUGH TIME

The economic contribution of Southern Minnesota Beet Sugar Cooperative varies by year. Factors affecting its economic contribution are the number of acres planted with sugarbeets and the growing season. A higher planted acreage increases economic contribution, as farmers invest additional resources into planting. Conversely, a poor growing season can lead to lower economic contribution, as the extraction facility will have lower expenses.

Since 1999, Southern Minnesota Beet Sugar Cooperative's planted acreage has increased by 11 percent. In 1999, growers planted slightly more than 114,000 acres; in 2017, they planted just shy of 127,000 acres (Chart 7). Given this increase in planted acreage, economic contribution related to

sugarbeet production is also up compared to 1999. Increases in planted acreage will continue to drive increases in contribution.

Chart 7: Planted and Harvested Acreage, Southern Minnesota Beet Sugar Cooperative, 1999-2017

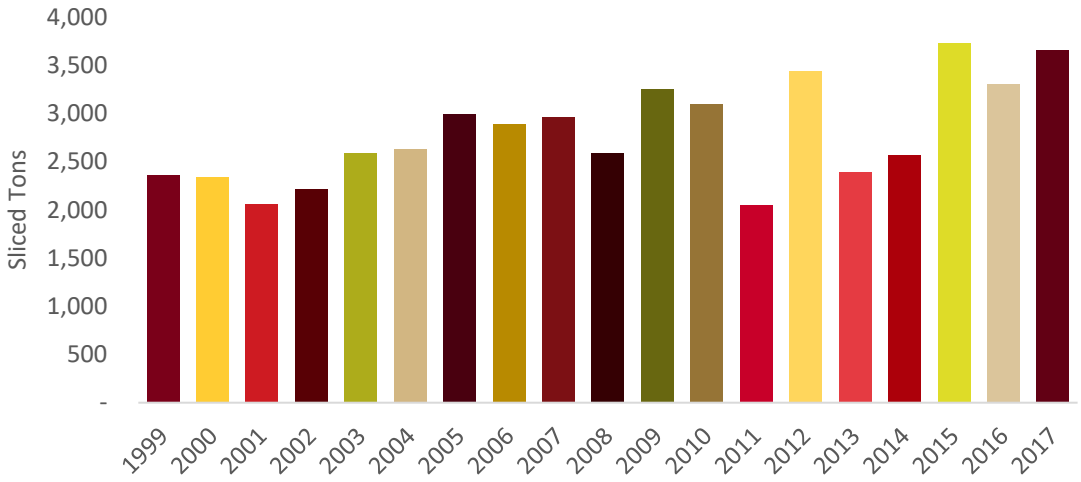


Source: SMBSC

Harvested acreage closely mirrors planted acreage, with the clear exception of 2013. In 2013, poor weather conditions (frost) led to a significant number of unharvested acres.

Beet sugar extraction has also increased with time. Compared to 1999, the total tons of sliced sugarbeets was up 55 percent in 2017. This reflects an overall trend toward increased production of sliced beets (Chart 8). It is also a direct reflection of SMBSC's continued investment in facility upgrades and improvements. These investments have increased the plant's capacity to slice beets and extract beet sugar.

Chart 8: Sliced Tons of Sugarbeets, Southern Minnesota Beet Sugar Cooperative, 1999-2017



Source: SMBSC

Overall, both factors influencing the economic contribution of Southern Minnesota Beet Sugar Cooperative are trending up.

ECONOMIC CONTRIBUTION IN MINNESOTA

Southern Minnesota Beet Sugar Cooperative also contributes to Minnesota's economy. In 2017, the Cooperative generated $817.8 million in economic activity in the state, including $227.9 million in labor income (Table 10). Southern Minnesota Beet Sugar Cooperative supported 5,240 jobs in the state.

Table 10: Total Economic Contribution of Southern Minnesota Beet Sugar Cooperative, Minnesota, 2017

Metric	Direct	Indirect	Induced	Total
Output (millions)	$358.3	$376.6	$82.9	$817.8
Employment	2,690	1,970	580	5,240
Labor Income (millions)	$89.0	$110.5	$28.4	$227.9

Estimates by University of Minnesota Extension

NOTES ON THE ANALYSIS

The data, analysis, and findings described in this report are specific to the geography, period, and project requirements of Southern Minnesota Beet Sugar Cooperative. Findings are not transferable. University of Minnesota Extension neither approves nor endorses the use or application of findings and other contents in this report by other jurisdictions or businesses.

This analysis is an economic contribution study. As such, it looks at the total value of SMBSC. A strong argument could be made that if the land were not in sugarbeet production, it would be used for another agricultural purpose. An economic impact study would examine the net effect—in other words, the value of sugarbeet production as compared to other crop production.

APPENDIX 1: SUGARBEET CROP ENTERPRISE ANALYSIS

This is the sugarbeet crop enterprise budget used by Extension for this economic contribution analysis. It can be retrieved at https://finbin.umn.edu/.

Sugar Beets on Cash Rent

	Avg. Of All Farms	2017
Number of farms	13	13
Acres	267.93	267.93
Yield per acre (ton)	31.58	31.58
Operators share of yield %	100.00	100.00
Value per ton	41.00	41.00
Total product return per acre	1,294.89	1,294.89
Crop insurance per acre	27.03	27.03
Other crop income per acre	34.93	34.93
Gross return per acre	1,356.86	1,356.86
Direct Expenses		
Seed	189.11	189.11
Fertilizer	79.41	79.41
Crop chemicals	149.04	149.04
Crop insurance	45.39	45.39
Fuel & oil	32.84	32.84
Repairs	55.21	55.21
Custom hire	66.29	66.29
Hired labor	10.26	10.26
Land rent	235.51	235.51
Stock/quota lease	36.66	36.66
Machinery leases	8.38	8.38
Hauling and trucking	27.57	27.57
Marketing	1.29	1.29
Operating interest	21.03	21.03
Miscellaneous	33.24	33.24
Total direct expenses per acre	991.22	991.22
Return over direct exp per acre	365.63	365.63
Overhead Expenses		
Hired labor	38.01	38.01
Machinery leases	1.10	1.10
Farm insurance	14.94	14.94
Utilities	8.38	8.38
Dues & professional fees	3.76	3.76
Interest	5.42	5.42
Mach & bldg depreciation	60.18	60.18
Miscellaneous	5.09	5.09
Total overhead expenses per acre	136.87	136.87
Total dir & ovhd expenses per acre	1,128.09	1,128.09
Net return per acre	228.76	228.76
Government payments	2.53	2.53
Net return with govt pmts	231.29	231.29
Labor & management charge	94.86	94.86
Net return over lbr & mgt	136.43	136.43
Cost of Production		
Total direct expense per ton	31.38	31.38
Total dir & ovhd exp per ton	35.72	35.72
Less govt & other income	33.68	33.68
With labor & management	36.68	36.68
Net value per unit	41.00	41.00
Machinery cost per acre	217.42	217.42
Est. labor hours per acre	4.55	4.55

APPENDIX 2: DEFINITIONS AND TERMS

Special models, called input-output models, exist to conduct economic impact analysis. There are several input-output models available. IMPLAN (IMpact Analysis for PLANning, Minnesota IMPLAN Group)[8] is one such model. Many economists use IMPLAN for economic impact analysis because it can measure output and employment impacts, is available on a county-by-county basis, and is flexible for the user. IMPLAN has some limitations and qualifications, but it is one of the best tools available to economists for input-output modeling. Understanding the IMPLAN tool, its capabilities, and its limitations will help ensure the best results from the model.

One of the most critical aspects of understanding economic impact analysis is the distinction between the "local" and "non-local" economy. The local economy is identified as part of the model-building process. Either the group requesting the study or the analyst defines the local area. Typically, the study area (the local economy) is a county or a group of counties that share economic linkages. In this analysis, the primary study area was the 20-county region.

A few definitions are essential in order to properly read the results of an IMPLAN analysis. The terms and their definitions are provided below.

Output

Output is measured in dollars and is equivalent to total sales. The output measure can include significant "double counting." Think of corn, for example. The value of the corn is counted when it is sold to the mill, again when it is sold to the dairy farmer, again as part of the price of fluid milk, and yet again when it is sold as cheese. The value of the corn is built into the price of each of these items and then the sales of each of these items are added up to get total sales (or output).

Employment

Employment includes full- and part-time workers and is measured in annual average jobs, not full-time equivalents (FTEs). IMPLAN includes total wage and salaried employees, as well as the self-employed, in employment estimates. Because employment is measured in jobs and not in dollar values, it tends to be a very stable metric.

Labor Income

Labor income measures the value added to the product by the labor component. Therefore, in the corn example, when the corn is sold to the mill, a certain percentage of the sale goes to the farmer for his/her labor. Then when the mill sells the corn as feed to dairy farmers, it includes some markup for its labor costs in the price. When dairy farmers sell the milk to the cheese manufacturer, they include a value for their labor. These individual value increments for labor can be measured, which amounts to labor income. Labor income does *not* include double counting.

Direct Impact

Direct impact is equivalent to the initial activity in the economy. In this study, it is spending by the sugarbeet producers and the extraction plant.

[8] IMPLAN Version 3.0 was used in this analysis. The trade flows model with SAM multipliers was implemented.

Indirect Impact

The indirect impact is the summation of changes in the local economy that occur due to **spending for inputs** (goods and services) by the industry or industries directly impacted. For instance, if employment in a manufacturing plant increases by 100 jobs, this implies a corresponding increase in output by the plant. As the plant increases output, it must also purchase more inputs, such as electricity, steel, and equipment. As the plant increases purchases of these items, its suppliers must also increase production and so forth. As these ripples move through the economy, they can be captured and measured. Ripples related to the purchase of goods and services are indirect impacts. In this study, indirect impacts are those associated with spending by the sugarbeet producers and the extraction plant for operating items.

Induced Impact

The induced impact is the summation of changes in the local economy that occur due to **spending by labor**. For instance, if employment in a manufacturing plant increases by 100 jobs, the new employees will have more money to spend to purchase housing, buy groceries, and go out to dinner. As they spend their new income, more activity occurs in the local economy. Induced impacts also include spending by labor generated by indirect impacts. So, if a sugarbeet producer purchases services from a local tax preparer, spending of the tax preparer's wages would also create induced impacts. Primarily, in this study, the induced impacts are those economic changes related to spending by the sugarbeet producers, their employees, and employees of the extraction facility.

Total Impact

The total impact is the summation of the direct, indirect, and induced impacts.

Input-Output, Supply and Demand, and Size of Market

Care must be taken when using regional input-output models to ensure they are being used in the appropriate type of analysis. If the models are used to examine the impact of an industry so large that its expansion or contraction results in major supply and demand shifts causing the price of inputs and labor to change, then input-output can overstate the impacts or impacts. Since this analysis looks at the current contribution of the industry (and does not project the impact of changes), the model should estimate reliably. It is important to remember this information, however, when considering this analysis.